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INTERFEROMETRY SYSTEM HAVING A DYNAMIC BEAM-STEERING
ASSEMBLY FOR MEASURING ANGLE AND DISTANCE

Background of the Invention

5 This invention relates to interferometers, e.g., interferometers for measuring the position and orientation of a measurement object such as a mask stage or a wafer stage in a lithography scanner or stepper system.

10 Displacement measuring interferometers monitor changes in the position of a measurement object relative to a reference object based on an optical interference signal. The interferometer generates the optical interference signal by overlapping and interfering a measurement beam reflected from the measurement object with a reference beam reflected from the reference object.

15 In many applications, the measurement and reference beam components that enter the interferometer have orthogonal polarizations and frequencies separated by a heterodyne, split-frequency. The split-frequency can be produced, e.g., by Zeeman splitting, by acousto-optical modulation, or by positioning a birefringent element internal to the laser. A polarizing beam splitter directs the measurement beam along a measurement path contacting a reflective measurement object (e.g., a stage mirror),

20 directs the reference beam along a reference path, and thereafter recombines the beams to form overlapping exit measurement and reference beams. The overlapping exit beams form an output beam that passes through a polarizer that mixes polarizations of the exit measurement and reference

25 beams to form a mixed beam. Components of the exit measurement and reference beams in the mixed beam interfere

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